

DESIGN NARRATIVE & OUTLINE SPECIFICATION

BELLEVUE COLLEGE GYMNASIUM REMODEL
Bellevue College

June 9, 2017

NAC
ARCHITECTURE

Project No. 121-17014

SUMMARY OF WORK

The purpose of architectural improvements of the Bellevue College G Building is to provide a more efficient programmatic layout while bringing the toilet and locker room facilities up to current accessibility standards. Two layout options have been presented and are being reviewed for feasibility in conjunction with the project budget.

Phase 1 includes demolition and reconfiguration of the general locker rooms, including shower and toilet facilities, and the general-use men's and women's toilet rooms. Phase 2 includes the completion of existing locker room demolition and subsequent restoration of the Fitness Center. Options A and B differ in the general layout and phasing. Option A includes renovation of team room facilities in Phase 1, while Option B provides for team rooms in Phase 2. Accessory space renovations also differ slightly between Options and Phases.

Construction materials will consist of CMU infill at walls where punched openings will be removed, and metal stud walls will be used at newly configured rooms. Ceramic tile will be used in shower stalls and toilet rooms, along with epoxy paint, and plywood backing where required for additional wall protection (i.e. corridors). Flooring is anticipated to be a combination of non-slip sheet vinyl and ceramic tile. Where appropriate, sealed concrete will be incorporated. New lockers will be added throughout the general, faculty, and team locker rooms.

The mechanical system serving the Bellevue College gym locker rooms is being reconfigured to accommodate a revised locker room layout. Where existing equipment is past its useful life it will be replaced. The project consists of two phases which are described in the Architectural narrative.

Mechanical systems will be provided as described below in accordance with the design-criteria, drawings, specifications, current local codes and standards. Also refer to the Mechanical drawings for proposed locations of major Mechanical equipment, duct/piping mains, risers/shafts.

The electrical design in the Gymnasium (G) Building will incorporate systems which will be low-maintenance and have a long life span so they can be expanded into other areas of the building to support future remodels. Systems and components will be flexible and robust, suitable for the industrial spaces they serve. Care will be taken throughout the design process to ensure that the systems specified do not limit the use of the facility.



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June 9, 2017

NAC Architecture
2025 1st Avenue #300
Seattle, WA 98121

Attn: Karee Loghry

Re: Design Narrative and Seismic Evaluation/Review of the proposed renovations to the
Gymnasium Building, located at the **Bellevue College, Bellevue, Washington**

Dear Ms. Loghry:

At your request, DCI Engineers has performed a Schematic Design Level review of the structural and seismic issues associated with the proposed renovations to the **Bellevue College Gym Renovation** located at Bellevue Community College in Bellevue, Washington, as part of the proposed improvements to the building. This report is a summary of our review process and the results of this study.

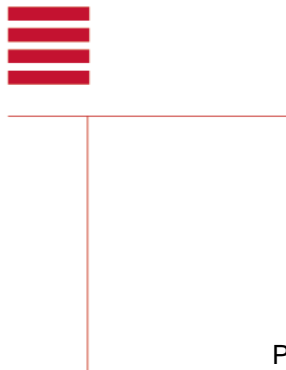

Executive Summary

The Bellevue Gym Building in the Bellevue College was constructed in approximately 1979. Very limited original architectural and structural drawings for the building were made available for our review. Based on our observation of the building and its similar construction to other buildings on campus, we could determine that the building is a concrete moment frame building with a precast concrete roof. The closest type of Seismic Force Resisting System (SFRS), as defined in ASCE 41-13 (the code referenced standard for the seismic evaluation of buildings), is that of a concrete moment frame (C1) with cast-in-place concrete beams and columns.

The primary goal of this report is to determine what structural remediation measures are required to accommodate the proposed changes and renovation to the building and how these will affect seismic rehabilitation measures as required by the 2015 Edition of the International Existing Building Code (IEBC). Based upon the discussions with the project team, we understand that the college is considering a general reconfiguration of the existing space with no change of use (or occupancy type) and no increase in its occupant load. Part of the goal of this report is to clarify the relationship between the proposed renovation and the associated seismic rehabilitation requirements.

With respect to the general structural concerns, we will discuss what structural measures will be required to perform the renovation.

With respect to the seismic concerns, based on our understanding of the Building Code requirements and of the proposed renovation, in this report, we will provide the following:

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1. Discussion of the building's construction system.
 2. Review how the proposed renovation relates to the code requirements for different levels of alteration and the corresponding seismic evaluation requirements.

Please note that this report was prepared for NAC Architecture and their clients. All third parties relying on this report shall, as a minimum, follow the guidelines of the 2015 IEBC.

DATA AND OBSERVATIONS

1. The Bellevue College Gym Building is a one-story, 26,000-sf concrete frame structure with cast-in-place concrete columns and beams. The concrete columns extend to the roof framing. The concrete beams are at the roof level, with pre-cast double tee concrete members – integral to and at the same level as the concrete beams - comprising the roof framing.
2. The building is one (1) continuous structure which is rectangular and regular in shape.
3. The building is founded on conventional spread footings.
4. Complete copies of the original architectural and structural drawings were not available for our review.
5. DCI assumes no liability or responsibility for the accuracy of the referenced architectural and structural drawing documents.
6. In absence of information to the contrary, the building at the property is assumed to have been constructed in accordance with the building codes in common use at the time of construction. This understanding forms the basis of the review presented in this report.
7. DCI was unable to review any of the original structural calculations nor did DCI perform any in-depth structural analysis of the building.
8. A walk-through survey of the building was made. During this field reconnaissance, DCI did not uncover any concealed structural elements and did not perform any destructive or material testing.

GENERAL STRUCTURAL RENOVATION MEASURES

Based on our review of the building and the construction documents, it is our conclusion that the building's construction system is a concrete frame system, with CMU masonry infill. The masonry infill is non-structural and these walls do not act as shear walls. For this reason, the removal of these walls, or the creation of openings in these walls, will not affect the integrity of the existing structural system – either in terms of the gravity system or the lateral system. Any walls may be removed or reconfigured, but if the basic concrete column and beam system is unaltered – and if there is not additional load imposed upon the existing system - there will be no renovation required to the structural system.



PROCEDURE / CODE REQUIREMENTS (SEISMIC)

The 2015 IEBC defines various levels of renovations to existing buildings. Within the IEBC, there are several types of renovations defined, each of which corresponds to a select set of seismic evaluation and rehabilitation requirements. The category for the proposed renovation is classified as that of the Work Area Method.

The Work Area Method is based upon the relative amount of work performed on the building, based on the percentage of the overall area of the building. Alteration-Level 1, includes “the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose.” Alteration Level 2, includes the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment. Alteration Level 3, applies to where the work area exceeds 50 percent of the building. The proposed renovation for the Bellevue Gym is accordingly classified as a Level 3 Alteration.

The seismic rehabilitation and evaluation requirements of an Alteration Level 3 are as follows. The Alteration Level 3 has the direct seismic rehabilitation requirement of replacing seismic capacity that has been removed or providing additional seismic capacity when additional seismic loading has been applied (e.g., seismic resisting elements are removed or altered, or an addition to the building adds load to an existing seismic resisting element). If there are any modifications to the structural system of a building undergoing Level 3 Alterations, the code requires that a seismic evaluation and analysis (ASCE 41 Tier 1) be performed and submitted to the code official. Since there are no structural modifications included in the proposed renovation, the ASCE 41 Tier 1 analysis is not a requirement and no modifications to the existing structural system will be required.

FINAL SUMMARY AND CONCLUSION

As noted above, if there are no modifications to the existing concrete columns and beams structural system, and if no additional load is imposed on the existing structural system, no structural or seismic rehabilitation will be required.

The basic detailing for new openings of existing walls is provided in the attached appendix.

Any new construction (partition walls or mechanical pads) will be performed per current construction methods based upon the materials selected by the architect (wood or metal stud non-structural framing).

Any additions to the existing structure or modifications to the existing structural system will need to be seismically isolated and independent of the existing structure. Representative detailing of this type of structural design is not presented in this level of Schematic Design and is beyond the scope of this current report.

Although we feel that our conclusions are based on a correct interpretation of the IEBC Code requirements, we recommend that a pre-submittal conference with the City of Bellevue Permit/Planning Reviewer be scheduled to discuss these issues prior to initiating the permitting process.

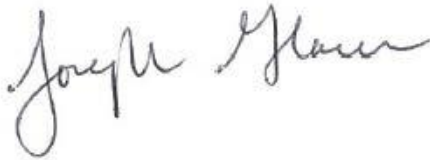


LIMITATIONS

This seismic evaluation report is not intended to identify all defects in existing workmanship or all potential seismic hazards. It is intended to identify basic structural conditions that are likely to significantly bear on the damageability of the building. This report is based on the review of existing record drawings and upon one (1) site visit performed in May 2017. This evaluation represents DCI's opinion based on the criteria listed above along with a good faith effort to obtain all available information. The report is not intended to guarantee the structural performance of the building in a seismic event. DCI assumes no professional liability for the use of the content of this report beyond the limitations outlined in the body of this report. The information and opinions expressed in this report have been developed and are subject to these limitations.

Please feel free to contact us should you have any additional questions or need for further information.

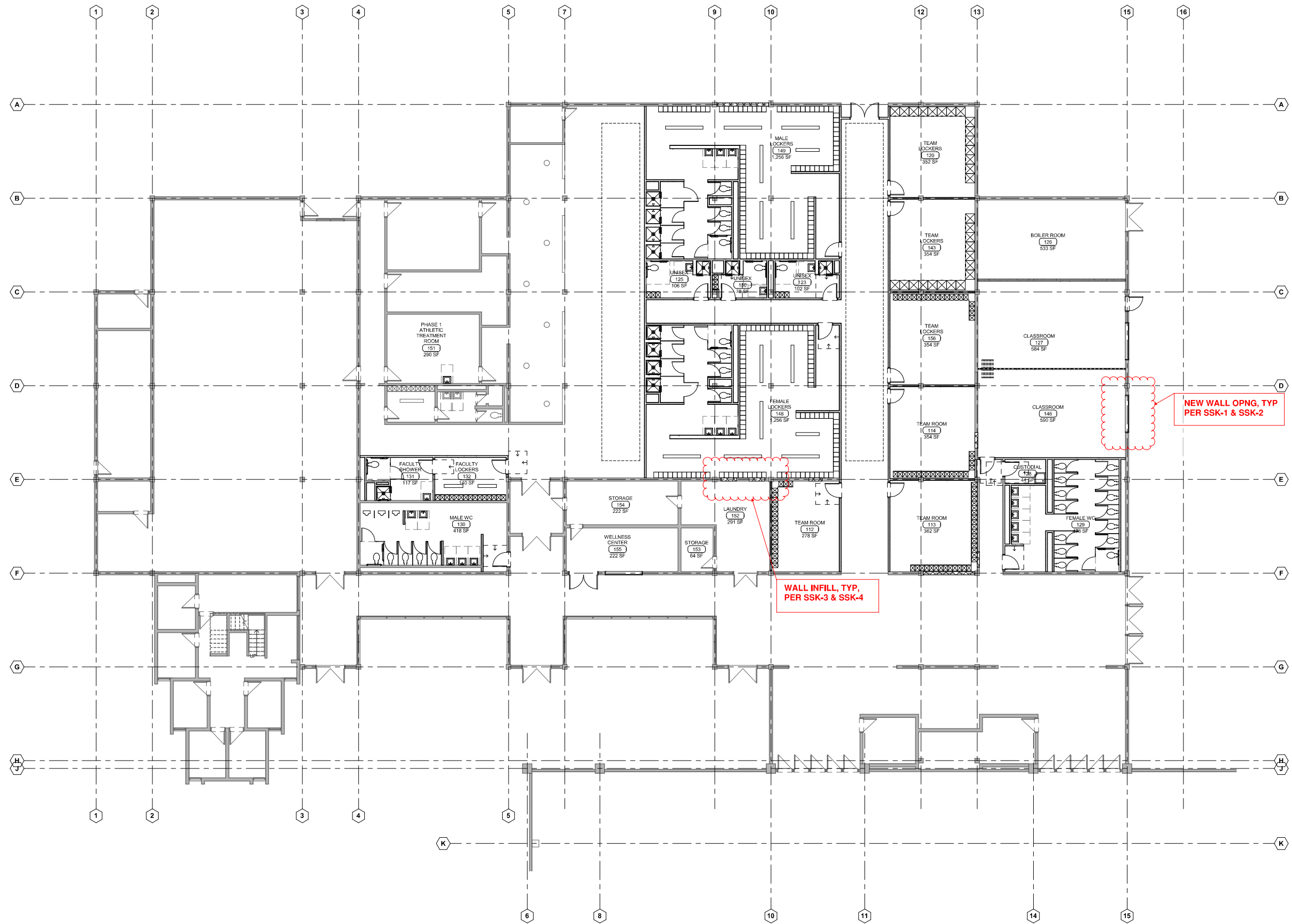
Sincerely,



Joseph Glaser, PE
Senior Structural Project Manager



Appendix A



1 OPTION A - FIRST FLOOR - PHASE 1
Scale: 1/8" = 1'-0"

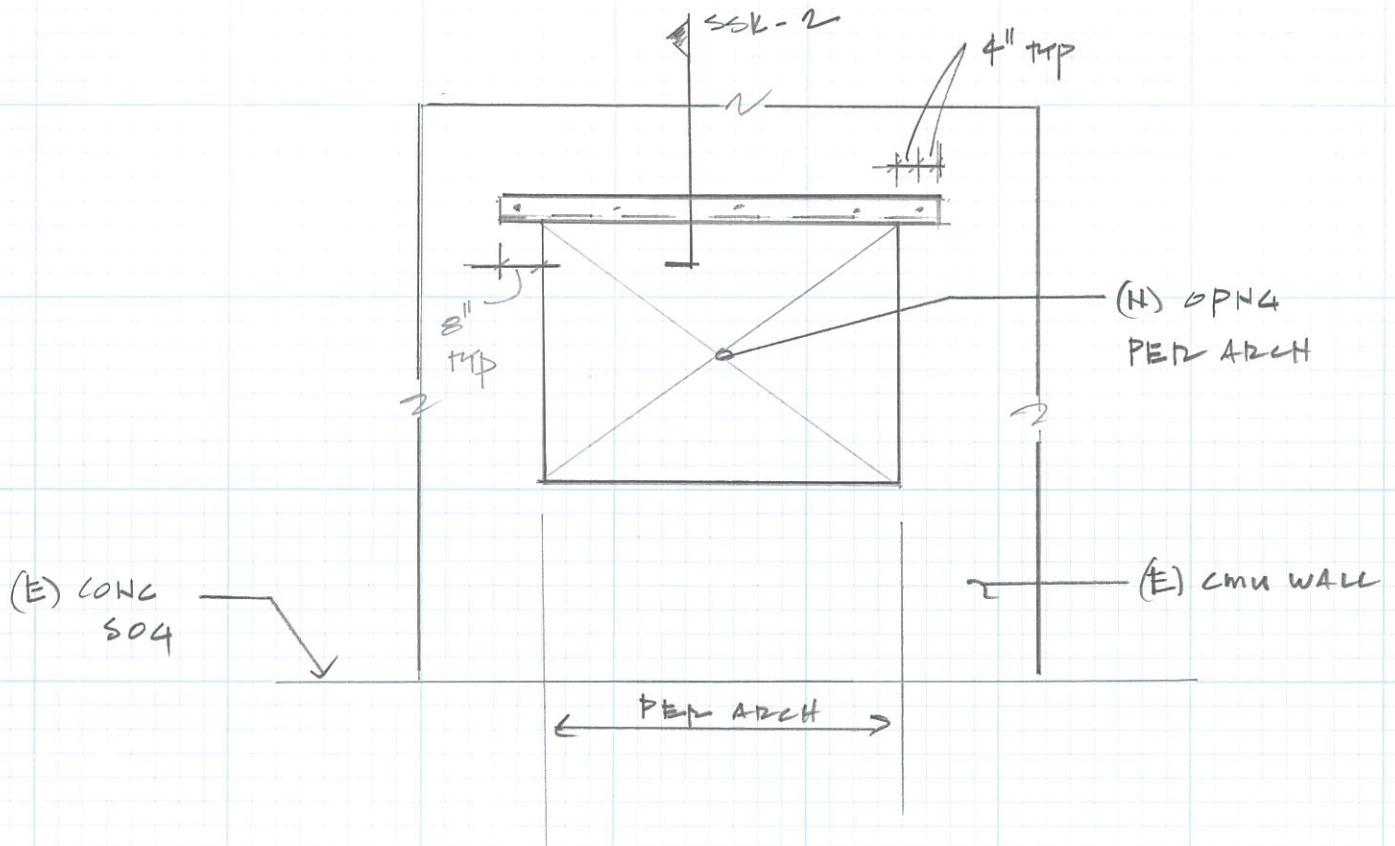
Project

BELLEUE COLLEGE GYM REMODEL

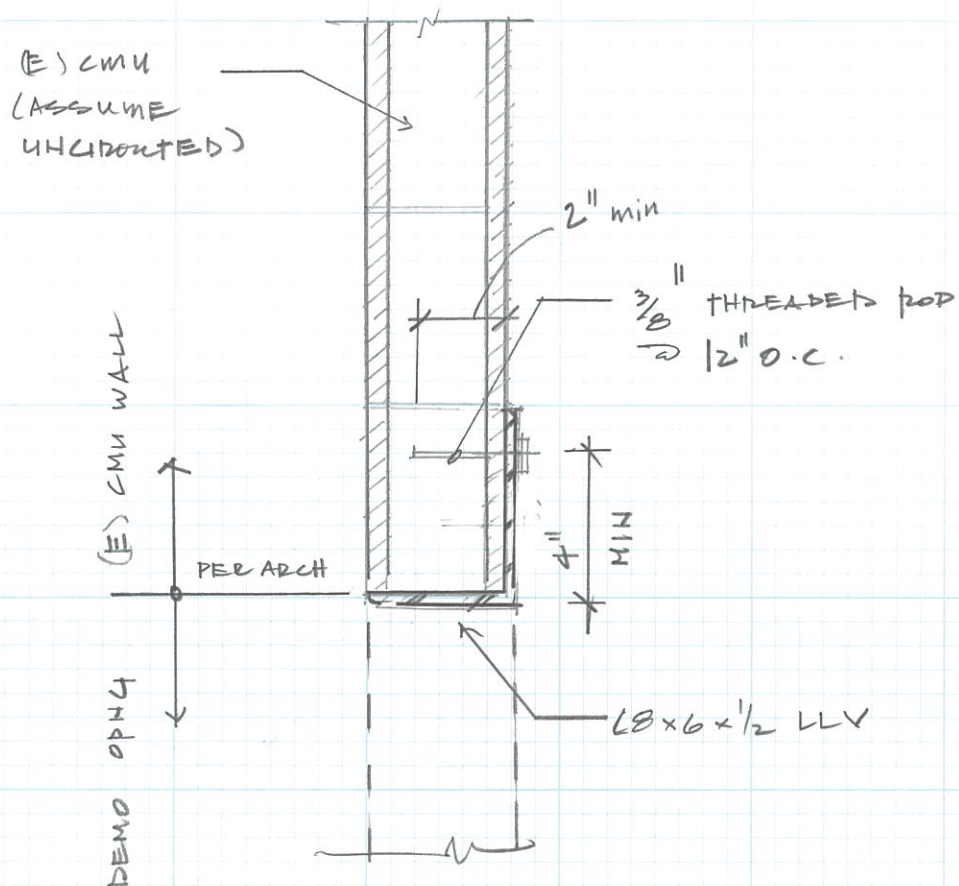
Date
6.12.17

Subject

By
JON



SSK-1 - WALL ELEVATION AT (H) OPENING
IN CMU WALL



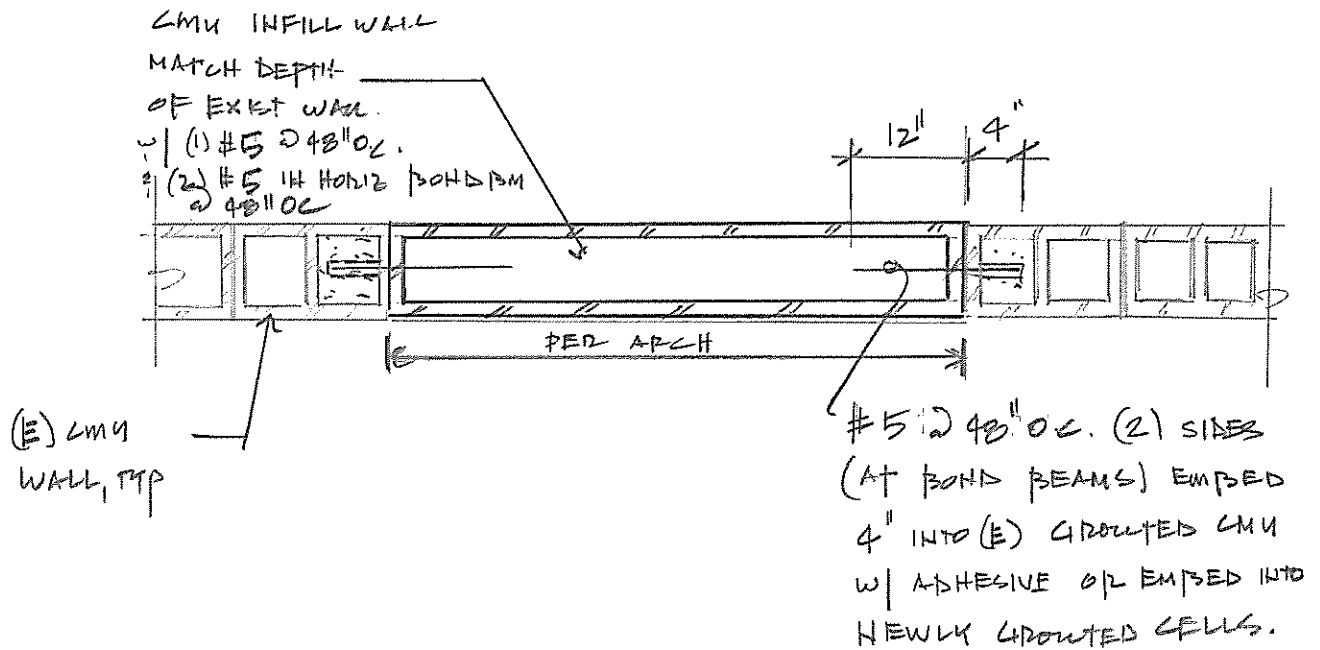
SSL-2 - WALL CONNECTION AT (H) OPNG

Project BELLEVUE COLLEGE GYM REMODEL

Date
6.12.17

Subject

By
JRG



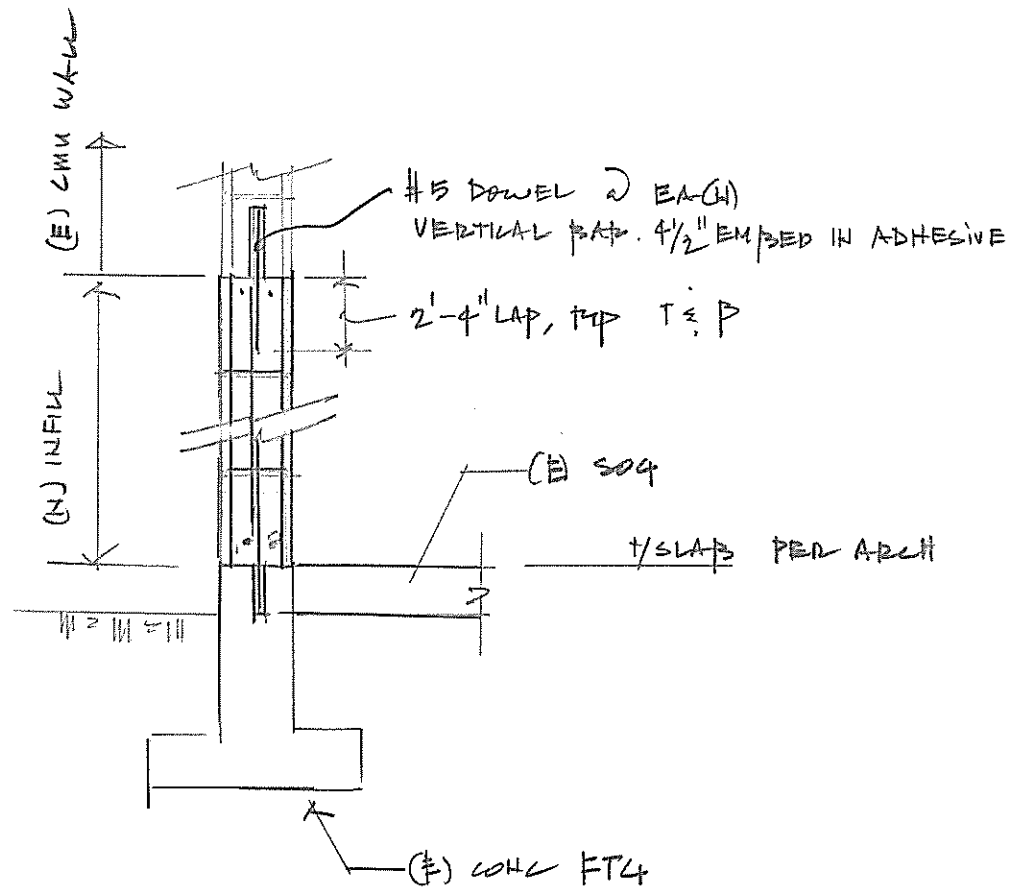
SS6-3 TYPICAL CMU INFILL AT WALL

Project BELLEVUE COLLEGE GYM REMODEL

Date
6.12.17

Subject

By
JRC



SSK-4 - TYP CMU WALL INFILL

basis of mechanical design narrative

June 9, 2017

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PHASE SD

SUMMARY OF WORK

The mechanical system serving the Bellevue College gym locker rooms is being reconfigured to accommodate a revised locker room layout. Where existing equipment is past its useful life it will be replaced. The project consists of two phases which are described in the Architectural narrative.

Mechanical systems will be provided as described below in accordance with the design-criteria, drawings, specifications, current local codes and standards. Also refer to the Mechanical drawings for proposed locations of major Mechanical equipment, duct/piping mains, risers/shafts.

CODES, REGULATIONS AND STANDARDS

Applicable codes and standards include the following:

- 2015 Washington State Energy Code
- 2015 International Mechanical Code
- 2015 Uniform Plumbing Code
- 2015 International Building Code
- NFPA-13, Installation of Sprinkler Systems
- NFPA-90A, Installation of Air Conditioning and Ventilating Systems
- NFPA-101, Life Safety Code
- ASHRAE Standard 52, Air-Cleaning Devices used in General Ventilation for Removing Particulate Matter.
- ASHRAE Standard 92, Ventilation for Acceptable Indoor Air Quality.
- Department of Labor, OSHA, Occupational Safety and Health Standards.
- Seismic Restraint Manual Guidelines for Mechanical Systems, 1991. Published by Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
- Energy (RCW 39.35): This RCW requires that a life cycle cost analysis of energy costs be conducted when designing a facility of this size. Building envelope, lighting, power and HVAC are expected to comply with the energy code.
- AABC Associated Air Balance Council
- ADC Air Diffusion Council
- AGA American Gas Association
- AMCA Air Moving and Conditioning Association
- ANSI American National Standards Institute
- ARI Air-Conditioning and Refrigeration Institute
- ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
- ASME American Society of Mechanical Engineers
- ASTM American Society for Testing and Materials

- CISPI Cast Iron Soil Pipe Institute
- CS Commercial Standards
- DOE Department of Energy
- EPA Environmental Protection Agency
- FM Factory Mutual
- IAPMO International Association of Plumbing and Mechanical Officials
- MSS Manufacturers Standardization Society of the Valves and Fittings Industry
- NCPWB National Certified Pipe Welding Bureau
- NEC National Electrical Code
- NEMA National Electrical Manufacturers Association
- NFPA National Fire Protection Association
- PDI Plumbing and Drainage Institute
- SMACNA Sheet Metal and Air Conditioning Contractors National Association
- UL Underwriters' Laboratories
- WISHA Washington Industrial Safety and Health Agency

HVAC DESIGN CRITERIA

Design Temperatures per Energy Code

	input	source
Outdoor air temp	24°F for heating 82°F db, 66°F wb for cooling	Washington State Energy Code, ASHRAE
Indoor air temp	70°F or lower for heating 75°F or higher for cooling	Washington State Energy Code C302, individual rooms described below.

Building Envelope (New Elements Only)

	Information received from the Architect
Opaque Walls	R-21 batt insulation
Doors	U=0.37
Glazing	Max. U=0.30, Max. SHGC=0.40 or per table WSEC table C402.4. Max. glazing to be approx. 29% of the exterior gross wall area.

Room Design Criteria

	DESIGN TEMPERATURE		MAXIMUM INTERNAL HEAT GAIN			COMMENTS
	Htg. (°F)	Clg. (°F)	Light (W/ft ²)	Equip.	Number of People	
Boiler Room	55	90	0.70		N/A	Thermostatically controlled automatic dampers, exhaust fan to limit heat build-up.
Lockers/ Team Lockers	70	75	0.60	N/A	N/A	0.5 cfm/sf exhaust min. 100% OA
Toilet Rooms	70	75	0.78	N/A	N/A	50 cfm/toilet exhaust min.
Classroom	70	75	0.80	400 BTU/Hr.	35 people/100 sf	

Wellness Center	70	75	0.70	N/A	3	
Team Rooms - Lockers	70	75	0.70	N/A	10	0.25 cfm/sq. ft. exhaust air.
Athletic Treatment Room	70	75	0.70	1 watt/sf	4	
Laundry	70	75	0.48	N/A	3	
Corridors	70	75	0.53	N/A	N/A	
Storage Rooms	70	78	0.50	N/A	N/A	
Custodial	70	78	0.7	N/A	N/A	

NOTES:

1. Heat gain attributable to occupants, lighting, solar radiation, and infiltration, are not included in the equipment column above.
2. Approximate +/- 2°F drift in temperature near the thermostat should be anticipated from the above listed design temperature set-points for the respective room thermostats. Setpoints are adjustable.

FIRE SUPPRESSION SYSTEMS**Fire Sprinkler System**

The area of remodel does not have fire suppression installed. In review of the International Codes a fire sprinkler system is not required to be installed as the remodel area is less than 50% of the gross area of the building. However, it is recommended that a fire suppression system be installed for life safety and property protection. A new fire suppression system will be evaluated with the budget and be provided if funds are available.

Fire-sprinkler system will be hydraulically designed and installed by Fire-Sprinkler Contractor (certified in the State of Washington) in accordance with the requirements under NFPA 13 and specific requirements per City of Bellevue Fire Marshall.

Materials/Products: All materials and installation of the fire-sprinkler system will comply with the standards described in NFPA 13.

PLUMBING PIPING SYSTEMS**Roof drainage**

Roof drains and overflow roof drains will be reused. Rain leader piping will be relocated where required to accommodate new floor plan.

Sanitary waste and vent piping will be provided for the following fixtures:

- Water Closets
- Urinals

- Lavatories
- Janitor's Mop Sink
- Showers
- Floor Drains
- Existing Fixtures

New waste systems will tie into existing waste mains. Existing vents through roof will be reused where practical. Sanitary waste and vent piping will continue to serve existing plumbing fixtures outside of renovation area.

Potable water will be provided to the following fixtures:

- Water Closets
- Urinals
- Lavatories
- Janitor's Mop Sink
- Shower
- Service box for Ice Machine
- Trap priming system
- Interior Hose Bibbs

Domestic waster systems will temporarily maintain service to select existing plumbing fixtures including clothes washer, drinking fountains, and the office sink; as and agreed to by Bellevue College.

Domestic Water system An approved reduced pressure backflow prevention device will be added to the existing cold water supply in the Boiler room. The existing water mains will be retained where their size is appropriate for the new service requirements.

Domestic How Water System

The existing building domestic hot water heaters will be replaced with a high-efficiency heat pump water-heater system with a storage tank (250 MBH capacity, 750 gallon storage). Hot water re-circulation will be provided to all plumbing fixtures per the WSEC requirements. An electric water heater, sized to maintain the recirculation loop temperature between 110°F to 120°F will be provided.

Natural gas

Piping (max. 150 scfh capacity) will be extended from existing meter to serve new roof top heat heat recovery units.

Rooftop Air Handling Units and Heat Recovery Units

Rooftop Air-Handling Units and air handling units with heat recovery (as manufactured by Aaon or approved equal) will replace existing units serving renovated spaces as shown on the drawings.

Miscellaneous Exhaust Fans

A separate exhaust fan will be provided to serve the Boiler room. Where air is being used for heat recovery existing exhaust fans will be removed.

Air Distribution

Distribution ductwork will be replaced where required to accommodate the updated space configuration. The majority of ductwork will require replacement based on the revised zoning

All replaced ductwork will be constructed in accordance with the S.M.A.C.N.A. standards as specified and as shown on the drawings.

Combination fire-smoke dampers will be provided at all duct-penetrations through fire-separations.

Duct mounted electric re-heat coils will be provided as shown on the drawings for zone temperature control; consistent with the original design concept for zone temperature control.

Grilles, registers, diffusers, volume dampers, and other ductwork accessories will be provided as required to achieve satisfactory system operation as scheduled and shown on the drawings.

Direct Digital Controls

H.V.A.C. Controls system will be microprocessor based Direct Digital Controls (DDC) as manufactured and installed by Alerton. The DDC controls will include provision for remote monitoring from the existing central control Operator's work-station on the main campus. CO2 sensors will be provided in the Classroom.

Testing, Adjusting and Balancing

Contractor will be required to hire an independent Balancing Agency (holding current certification from the National Environmental Balancing Bureau or from the Associated Air Balance Council) subject to approval by the Owner. Balancing agency shall have experience with minimum three successfully completed projects of similar size and complexity during the last five years. Contractor will be responsible for coordinating and scheduling necessary equipment operation with the assistance of appropriate-trades to support the work to be performed by the Balancing Agency. Following systems will be balanced.

- Supply Air
- Return Air
- Exhaust Air
- Domestic Hot Water System

Commissioning

Mechanical systems will be commissioned by an independent Commissioning Agent (Professional Engineer and active member of Building Commissioning Association in Washington State) experienced with minimum three successfully completed projects of similar size and complexity. Mechanical systems will be commissioned in accordance with the Specifications (including Functional Performance Testing of components as well as systems) to be provided by Commissioning Consultant hired by the Owner.

Mechanical systems to be commissioned are as follows:

- Heating Hot Water System
- Air Handler/Heat Recovery Systems
- Exhaust Systems
- Direct Digital Controls Systems including all Sequence of Operations
- Domestic Cold/Hot Water Systems

Room Pressurization:

Locker rooms and toilets rooms will have negative pressurization but the building overall will be positively pressurized.

END OF DOCUMENT

basis of electrical design narrative

June 9, 2017

PROJECT Bellevue College – G Building
Bellevue College | Bellevue

PHASE SD

SUMMARY OF WORK

The electrical design in the Gymnasium (G) Building will incorporate systems which will be low-maintenance and have a long life span so they can be expanded into other areas of the building to support future remodels. Systems and components will be flexible and robust, suitable for the industrial spaces they serve. Care will be taken throughout the design process to ensure that the systems specified do not limit the use of the facility.

CODES, STANDARDS, AND REFERENCES

The following references shall be used for the design of the electrical systems:

- WAC 296-46B: Electrical Safety Standards, Administration and Installation
- 2015 Washington State Nonresidential Energy Code
- 2017 National Electrical Code
- 2015 International Building Code with Washington State Amendments
- 2015 International Fire Code with Washington State Amendments
- 2015 International Mechanical Code with Washington State Amendments
- Illuminating Engineering Society of North America (IESNA), Lighting Handbook
- NFPA 72; National Fire Alarm Code
- PSE Regulations

ENERGY CODE REQUIREMENTS

The 2015 Washington State Nonresidential Energy Code edition requires the following measures is achieved for this project:

- Local lighting controls shall be installed within each space.
- Lights located within daylight zones require daylight or occupancy sensing controls.
- Automatic lighting controls are required to shut off interior building lighting.
- Occupancy sensors are required in offices smaller than 300 square feet.
- Occupancy sensors are required in classrooms and meeting and conference rooms.
- Spaces with occupancy sensors shall have a manual switch for shutting lights off.
- Lighting controls shall be commissioned.
- Lighting power allowances shall not exceed the following:
 - o Interior:
 - Educational Areas: 1.00 Watts/square foot
 - Fitness Center/Exercise Areas: 0.58 Watts/square foot
 - Locker Room: 0.60 Watts/square foot
 - Corridors: 0.53 Watts/square foot
 - Storage Areas: 0.50 Watts/square foot

SITE UTILITIES

Power - Utility Service

The existing Building is served 12.47kV, 3 phase, 3 wire medium voltage loop. The existing medium voltage transformer and switches have reached their expected life and it is recommended they be replaced. This equipment is currently being reviewed under a separate project.

POWER SYSTEM

Power Distribution

The service voltage is currently 480 / 277 Volts wye, 3 phase, 4 wire and the existing main switchboard is rated for 4,000 Amps. The main switchboard feeds G building loads as well as buildings K, L, Maintenance building and warehouse building. The existing switchboard was installed during the original construction of G building in 1970 and has reached its expected useful life and it is recommended that it be replaced..

The existing electrical branch circuit panelboards within the building were also installed at that same time and have reached their expected useful life. Any panel that has a branch circuit that is being modified will be replaced with new. New transformer and branch circuit panel will be installed to support the new plug loads in the remodel areas. A minimum of 25% spare capacity and circuit breaker provisions will be provided in new panelboards to allow for future growth.

Existing mechanical loads are served at 480 Volts, 3 phase and are being replaced. The loads will be reviewed and new branch circuits may be required for the new mechanical equipment. Lighting is primarily 277 Volts and the egress lighting is all 120V along with small convenience loads as well as power receptacles. To enhance power quality, the electrical distribution system will be segregated by load type as much as practical. Separate panelboards for lighting, mechanical equipment, plug load power will be provided when loads allow.

Panelboards will have bolt-on circuit breakers and copper bus. Transformers will be energy efficient dry-type, 480 Volts primary to 208Y/120 Volt secondary and copper windings. Circuit breakers will be utilized for overcurrent protection throughout the facility. Electronic trip units will be utilized for 480 Volt circuit breakers 600 Amps and larger. All equipment will be fully rated for the available fault current; series-rated devices will not be utilized.

Panelboards will be replaced in kind within the electrical rooms throughout the facility as new panelboards to serve the new building loads. New wall-mounted panels will be located in the Boiler room to allow for increased flexibility and cost..

Wiring Methods

The existing feeders and branch circuits are routed through/under slab or poured into the overhead concrete. These pathways are not planned for reuse and new will be installed where required to support new equipment and loads. Feeders and branch circuits will utilize copper conductors with 600 Volt THWN/THHN insulation. Conductor size shall be #12 AWG minimum. Aluminum conductors will not be permitted. Conductors will be sized to limit voltage drop to

1.5% in feeders and 3% in branch circuits. The use of metal clad (MC) cable is not currently planned.

Feeders and branch circuits shall be installed in raceway and shall generally be routed overhead; wiring beneath the slab will be provided only where required to back feed existing to remain loads if the branch circuit were cut during removal of the existing slabs. Galvanized rigid steel conduit or intermediate metal conduit shall be used for feeders, for circuits exposed to physical damage. Otherwise, electrical metallic tubing with steel compression fittings shall be used throughout.

In classrooms, the power and communications distribution system must be designed to integrate with the architecture, while providing flexibility for the future. Typical spaces will have receptacles in the walls and branch circuit wiring overhead.

Wiring Devices

Wiring devices in most areas will be specification grade with stainless steel coverplates. Ground fault circuit interrupters (5 milliamp) will be provided for all 120 Volt, 15 and 20 Amp devices in locker room and team room areas.

Power Monitoring

Power monitoring devices are not anticipated to be provided as part of this project but will be evaluated if requested by the owner. The power monitoring equipment would incorporate microprocessor based electronic metering to monitor kW, kWh, Amps per phase, Volts, demand kW, harmonics and power factor.

Transient Voltage Surge Suppression

Transient Voltage Surge Suppression (TVSS) will be provided at the service entrance switchboard if the switchboard is replaced as part of this project. In addition, TVSS will be provided at panelboards serving classroom loads.

EMERGENCY / STANDBY POWER SYSTEMS

Emergency and Standby Power

The existing emergency lighting utilizes a tap ahead of the main to power egress light fixtures along with battery powered exit signs. The fire alarm system does not currently have battery backup. The tap ahead of the main for egress lighting is no longer a code accepted method for providing code minimum lighting. New egress lighting loads such as egress and exit lighting and will be provided with batteries in accordance with code requirements. The new fire alarm equipment will be provided with batteries in accordance with code requirements.

Grounding System

The existing grounding electrode system will not be changed as part of this project unless the main switchboard is replaced.

Equipment grounding conductors will be provided for all feeders and branch circuits.

LIGHTING SYSTEM

General

The lighting system will address specific “visibility” requirements for the project and each individual space. “Visibility” includes issues such as light quality, occupant comfort, as well as aesthetics. It is critical that the visibility issues be addressed for each space to provide maximum occupant comfort, ultimately resulting in reduced Owner costs. A quality lighting system will not only add visual interest to a space, but may also increase employee productivity and student performance, reduce sick time and improve morale. Once the visibility issues have been identified and addressed, the lighting system can be designed to provide maximum energy efficiency. Our goal is to exceed the energy code requirements by at least 10% for the lighting systems while meeting the visibility requirements.

Visibility Issues

The building includes a number of environments with distinct visibility issues. The artificial illumination must balance ratios between tasks (i.e. computer and paper tasks) in the form of low contrasts. Minimizing glare and veiling reflections is a primary goal. This will be achieved with the use of lighting equipment, sources, and controls. Listed below are spaces and their specific visibility requirements:

Classrooms

Ambient lighting will be required to provide adequate horizontal illumination for reading and notetaking while providing low-glare for computer use. The instructional tasks will require a flexible lighting system with increased vertical illumination at the front of the classroom for viewing instructional presentation materials as well as viewing video. The classrooms will require excellent color rendition. Direct/indirect illumination for ambient lighting would provide quality illumination as well excellent visibility.

Locker & Team Rooms

Ambient lighting will be required to provide adequate horizontal illumination for changing and viewing white boards. Fixtures will be impact resistant to withstand direct contact from sports balls or other object that are available to be thrown. Surface mounted direct illumination for ambient lighting would provide quality illumination as well excellent visibility.

Emergency Lighting

Egress and exit lighting will be provided for egress pathways in accordance with code requirements and will utilize integral batteries. Emergency ballasts will be integrated into fluorescent fixtures for exit corridors. Shop spaces will likely utilize battery-type bug-eye emergency lighting units for egress lighting. Exit lighting will be LED type.

Illumination Levels

The following average maintained illumination levels, in footcandle (fc), shall be designed to:

area/activity	category*	design fc*
Classrooms	Q	40
Storage	M	10
Corridors	C	15
Restrooms	C	15
Lockers	K	5

**Per IESNA "Lighting Application Handbook"*

Equipment

LED luminaires will primarily be used in all spaces to meet current energy code requirements. 4100K fixtures will be utilized throughout the remodel space. The number of different lamp types will be minimized.

Lighting Control Systems

A lighting control system will be provided for the remodel areas of the building. The system inputs will be a photocell, low voltage switches, occupancy/vacancy sensors and time-of-day inputs sweep signals from the mechanical control system.

Occupancy sensors will be provided for classrooms, restrooms and team spaces. Digital timer switches will be provided for shower areas.

Lighting within daylight zones will be controlled separate from other areas. Automatic daylighting controls will be provided where required by the energy code.

Fire Alarm System

The existing building fire alarm system was part of the original construction of the building and is beyond its useful life and parts are no longer available for the system. The system does not meet current code requirements for battery backup, supervisory signals, three tone temporal horns, visual notification among other things. The remodel areas are required to have smoke detection so a new fire alarm system will be installed within the building. New audible and visual notification devices will be installed through the entire building including non-remodel areas. The fire alarm panel will be a standalone intelligent, software-controlled addressable fire alarm and detection system. It will consist of a fire alarm control panel located where the existing fire alarm panel is located, a network switch and an annunciator located at the fire department response point. The new fire alarm panel will be networked with the existing campus Edwards EST 3 equipment to connect to the central station for monitoring. The system shall be capable of interfacing with a future campus fire alarm network. Building fire alarm wiring will be installed within a raceway system.

Detection devices will consist of intelligent analog addressable smoke detectors, heat detectors, manual pull stations. To minimize nuisance alarms smoke detectors will utilize a combination of

photoelectric, ionization and thermal detection. Detection devices will be located in accordance with NFPA 72 and the Fire Code.

Annunciating devices will be a combination of ADA compliant audible and audible/visual devices in accordance with NFPA 72 and the Fire Code. Speakers will be utilized for audible notification.

The fire alarm system will interface with and control auxiliary equipment including fire doors, fan starters for shutdown and fire/smoke dampers where required.

END OF DOCUMENT

DIVISION 02 - EXISTING CONDITIONS

024119 Selective Structure Demolition

Demolition and removal of selected portions of existing building elements to accommodate building renovations and utility work.

Locate and document existing utilities and controls.

Save and protect from harm any trees, structures, features, and facilities to remain.

Remove and dispose of utility materials from below the ground surface as required. Cap and abandon utilities where not required to be removed.

Identify, and coordinate with the Owner's Representative and/or utility purveyor(s), the disconnection, capping, abandonment, and/or removal of utilities as required.

Salvage existing materials as specified.

Dispose of material from the site.

DIVISION 03 - CONCRETE

033000 Cast-In-Place Concrete

General building and structural applications: capillary break & vapor retarder for slabs-on-grade; walkways.

035413 Cementitious Underlayment

Leveling of existing floor slab in select locations in preparation for new flooring.

DIVISION 04 - MASONRY

042000 Unit Masonry

Wall infill at existing building: standard smooth face units 16" long X 8" high X 8" or 6" deep (nominal); unit masonry accessories.

DIVISION 05 - METALS

051200 Structural Steel Framing

Structural steel building reinforcement: Reinforcing for CMU at new openings in existing walls.

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

061000 Rough Carpentry

Furring, grounds, nailers, and blocking.

061600 Sheathing

Plywood wall sheathing.

064023 Interior Architectural Woodwork

Laminate-clad countertops and cabinets, utility shelving, window sills.

066400 Plastic Paneling

Fiberglass Reinforced Plastic (FRP) and Fiberglass Reinforced Laminate (FRL) panel wainscot & wall protection.

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

071113 Bituminous Dampproofing

Cold-applied dampproofing for below-grade footings & foundation walls where the opposite side of wall faces building interior spaces.

072100 Building Insulation

General foundation & building insulation.

074646 Fiber-Cement Siding

Fiber cement panel siding.

076200 Sheet Metal Flashing and Trim

Custom-fabricated wall flashings and manufactured through-wall flashing and reglets.

079200 Joint Sealants

Elastomeric, latex, preformed, and acoustical sealants; backer rods.

DIVISION 08 - OPENINGS

081113 Hollow Metal Doors and Frames

Standard and custom hollow metal units.

081416 Flush Wood Doors

Wood-veneer solid-core units for transparent factory finish.

083113 Access Doors and Frames

Wall & ceiling units.

084113 Aluminum-Framed Entrances and Storefronts

Interior storefront framing and hardware; framing for window walls, and punched openings.

085113 Aluminum Windows

Aluminum windows for installation in storefront system.

087100 Door Hardware

Door hardware product specifications.

088000 Glazing

Glazing for storefronts, doors, windows and relites.

DIVISION 09 - FINISHES

092116 Non-Structural Metal Framing

Interior and exterior non-load-bearing wall studs; furring for hard lid ceiling attachment.

092900 Gypsum Board Assemblies

Interior and gypsum board panels.

093013 Ceramic Tiling

Ceramic mosaic, porcelain and glazed floor and wall tile.

095113 Acoustical Panel Ceilings

Mineral-base panels with exposed suspension systems.

096200 Flooring Preparation

Trowelable underlayments and patching compounds.

096516 Resilient Sheet Flooring

Non-slip vinyl sheet floor coverings with integral coved base.

099113 Exterior Painting

Exterior painting of exterior siding, CMU, hollow metal frames and doors, and miscellaneous steel.

099123 Interior Painting

Interior painting of gypsum board, existing and new CMU, hollow metal frames and doors.

DIVISION 10 - SPECIALTIES

101100 Visual Display Surfaces

Whiteboards.

101400 Identifying Devices

Interior signs.

102113 Toilet Partitions

Plastic-laminate clad floor- and wall-mounted toilet enclosures and urinal screens.

102233 Accordion Folding Partitions

Acoustical, mechanically operated accordion folding partitions.

102600 Wall Protection

Stainless steel corner guard protection for walls.

102800 Toilet, Bath, and Laundry Accessories

Mirrors, grab bars, feminine napkin disposals, recessed trash receptacles, mop and broom holder at custodial room.

104413 Fire Extinguisher Cabinets

Semi-recessed fire extinguisher cabinets.

104416 Fire Extinguishers

Portable fire extinguishers.

105113 Metal Lockers

Athletic metal lockers.

DIVISION 22 - PLUMBING

220000 Plumbing Work Specified In Division 23

Description: The following sections apply to the Work in this section:

- Section 230500 - General Provisions
- Section 230505 - Project Closeout and System Start-Up
- Section 230510 - Basic Materials and Methods
- Section 230513 - Electrical Provisions for Mechanical Work
- Section 230520 - Mechanical Demolition
- Section 230533 - Electrical Heat Trace
- Section 230548 - Vibration Isolation
- Section 230550 - Seismic Control
- Section 230700 - Mechanical Insulation
- Section 230800 - Mechanical Systems Commissioning
- Section 230810 - Systems Training
- Section 230820 - Systems Operations and Maintenance Manuals
- Section 232116 - Piping Specialties
- Section 235100 - Flues and Stacks

221116 – Domestic Water System

The Work includes domestic water piping for potable and non-potable systems and associated appurtenances.

Piping:

All Sizes Inside Building: Copper tubing.

3 Inch and Larger Outside Building (Buried) and Underground Inside Building: Cement-lined ductile iron pipe and joints with rubber gaskets and rod ties.

2 Inch and Smaller: Crosslinked polyethylene (PEX-a) manufactured by Engel-Method or polypropylene (PP-R and PP-RCT). (Contractor Options).

Backflow Preventers: Reduced pressure principle backflow assembly. Hose end vacuum breaker. Manufacturer as listed in "Backflow Prevention Assemblies Approved for Installation in Washington State" or as listed in local code requirements.

Strainers: Y-type with 3/64 inch perforations at 233 per square inch. Armstrong Fluid Technology, Watts, Crane, Hoffman Specialty, Metraflex, Spirax Sarco, Nibco, or approved.

Water Meters: Positive displacement type for sizes 2-1/2 inch and smaller and turbine or compound type for sizes 3 inch and larger. Include pulsing generator for connection to direct digital control system specified in Section 230900.

Trap Primers: Electronic, Vacuum breaker trap primer type. Zurn, Precision Plumbing Products (P.P.P.), Jay R. Smith, Sloan, or approved.

221120 – Plumbing Valves

The Work includes valves and associated appurtenances for plumbing systems. Fairbanks, Hammond, Jenkins, Milwaukee, NIBCO, Powell, Stockham, Walworth, DFT, Metraflex, Jomar Group, KITZ, or Apollo/Conbraco.

Gate, Globe, and Check Valves: Bronze with screwed or soldered joint ends for sizes 2-inch and smaller and cast iron with flanged ends for sizes 2-1/2 inch and larger.

Ball Valves: Full port, 2 piece construction with lever handle and memory stop.

Butterfly Valves: Lug type with lever handle operator for sizes 3 inch and smaller and gear operator for sizes 4 inch and larger.

Balancing Valves: Globe style with meter connections, calibrated handwheel, and memory stop. Bell & Gossett Circuit Setter® Plus Model RF-LF or CB-RF Series, Victaulic, or approved.

Pressure Reducing Valves: Bronze with screwed ends for sizes 3 inch and smaller and cast iron with flanged ends for sizes 4 inch and larger. Watts, Cash Acme, Zurn-Wilkins, or approved.

Thermostatic Mixing Valves: Self-contained, single valve for sinks and lavatories. High/low manifold system for high and variable domestic water usage such as showers and dishwashers. Leonard, Powers, Acorn, or approved.

221123 – Plumbing Pumps

The Work includes pumps and associated appurtenances.

Domestic Hot Water Circulating Pump: Centrifugal, in-line, bronze construction, motor driven. Bell & Gossett 3530 Series, Armstrong Fluid Technology, Grundfos, or approved.

221300 – Soil, Waste, Vent, and Storm Drain Piping Systems

The Work includes building drainage piping and associated appurtenances.

Piping:

Heavy Duty Couplings for Underground Waste, Vent, and Rainleader Pipe and Fittings: Cast iron with hub and spigot or hubless joints with heavy duty stainless steel clamps. Clamp-All HI TORQ 125, Anaco-Husky SD 4000 or Thermafit Industries POC, NewAge Castings, or MG Couplings.

Standard Duty Couplings for Aboveground Pipe and Fittings: Clamp-All HI TORQ 80 or, Anaco-Husky HD 2000, Mission Rubber Company HeavyWeight, Ideal Heavy Duty, Ideal Tridon Couplings Heavy Duty, Tyler Pipe, Thermafit Industries POC.

Polyvinyl Chloride (PVC): Schedule 40, plain ends.

223000 – Plumbing Equipment

The Work includes water heaters, storage tanks, expansion tanks, and associated appurtenances.

Water Heaters, Electric: Tank type, commercial-grade, ASME labeled. A.O. Smith, Rheem, State, Bradford White, PVI Industries, Lochinvar, or approved.

Domestic Water Heat Pump: Electric air-to-water heat pump. Colmac Waterheat, no substitutions.

Storage Tanks: Vertical configuration, glass lined tank. Ace Boiler, A.O. Smith, Weben Jarco, Lochinvar, Wessels, or approved.

Expansion Tank: Pre-charged type with butyl diaphragm and polypropylene liner, ASME labeled. AMTROL Therm-X-Trol, Bell & Gossett, Armstrong Fluid Technology, or approved.

224000 – Plumbing Fixtures

The Work includes plumbing fixtures and fittings, installations of and connections to Owner furnished plumbing fixtures and fixtures furnished under other specification divisions and associated appurtenances.

Plumbing Fixtures:

Water Closets: Vitreous china, wall mounted with sensor flush valve siphon jet bowl design. Kohler, American Standard, Crane, Zurn, Mansfield, and Acorn for fixtures, Sloan, Zurn, and Delany for flush valves, and Church, Olsonite, Bemis, and Kohler for closet seats, or approved.

Urinals: Vitreous china, wall hung with sensor flush valve. Kohler, American Standard, Crane, Zurn, and Acorn for fixtures and Sloan, Zurn, and Delany for flush valves, or approved.

Lavatories: Vitreous china, wall hung with sensor faucet. Kohler, American Standard, Crane, Acorn, Bradley, Mansfield, Zurn for fixtures and American Standard, Kohler, Delta, Elkay, Just, Moen (Commercial line only), Grohe, Chicago Faucets, Speakman, and Leonard for faucets, or approved.

Sinks: Stainless steel with faucet. Just, Elkay, Kindred, or approved.

Service (Mop) Sinks: Floor mounted with faucet. Fiat, Kohler, Acorn, or approved.

Showers: Mixing valve with shower head for molded cross-linked acrylic sheet shower stall. Include hand spray shower system for accessible fixtures. Comfort Designs X, Kohler, Lasco, Mustee for prefabricated shower enclosures, Acorn, Delta, and Bradley for shower head/faucets, or approved.

Drinking Fountains and Electric Water Coolers: Dual level, stainless steel, wall mounted with bottle filler. Elkay, Haws, Halsey Taylor, Oasis, Acorn, or approved.

Hose Bibbs and Wall Hydrants: Recessed, with vacuum breaker, freeze-proof for exterior locations. Acorn, Chicago Faucets, Jay. R. Smith, Wade, Woodford, Murdock, or approved.

Service Outlets: Recessed box with hot and cold water supply valves, drain connection for bottom water supply connections. Guy Gray, Jones Stephens Corp. (PlumBest), or approved.

Miscellaneous Fittings: BrassCraft, T & S Brass, McGuire, or approved.

Under-Sink Protection for Accessible Fixtures: Truebro, McGuire, or approved.

DIVISION 23 - HVAC

230500 - General Provisions

The Work includes materials, equipment, labor, supervision, tools and items necessary for construction, connection, testing, and operation of mechanical work. This section applies to all Divisions 21, 22, and 23 sections.

Provide mechanical work in conformance with the International Building Code, International Mechanical Code, Uniform Plumbing Code, Washington State Energy Code Commercial Provisions, NFPA, National Electrical Code, and applicable state and local codes, ordinances and standards.

Perform work in accordance with state and local safety regulations.

Prepare electronic product data and 3D shop drawing submittals.

Prepare and submit schedules of values.

Prepare Record Drawings.

Use of HVAC systems for temporary heat and ventilation will not be allowed except with the Owner's permission with specific conditions.

Include minimum 1 year parts and labor warranty except where longer warranties are required in individual specification sections. Warranty commences with date of Substantial Completion.

Commissioning Support: Submit equipment start-up and test procedures and preliminary Operation and Maintenance Manuals to the Commissioning Authority as specified in Section 230800. Submit under separate bound cover.

230505 – Project Closeout and System Start-Up

The Work includes material and labor required to perform start-up of equipment and systems installed in project, to perform checkout of systems, and to verify completeness of project requirements.

Submit the Following:

Checklist for each piece of scheduled equipment indicating items that will be verified for proper operation and completeness of installation. Include an area for comments and completion date for correction of deficiencies. Use of the equipment manufacturer's standard start-up/checkout form is acceptable.

Checklist of controls by system or piece of equipment indicating items that will be checked, sequences that will be checked, and completeness of installation. Include area for comments and completion date for correction of deficiencies.

Checklists shall have place at each item for person doing checkout to initial item indicating task has been completed and date it was completed.

Preliminary schedule indicating sequence of events involved with pre-functional check-out, mechanical equipment start-up, testing, adjusting, and balancing (TAB), TAB verification, and mechanical system functional testing. Schedule shall indicate approximate time intervals required for completion of respective tasks.

Prepare and submit list of items that are not complete prior to requesting Substantial Completion review by the A/E.

230510 - Basic Materials and Methods

The Work includes equipment supports, sleeves, identification, appurtenances, and miscellaneous work. This section applies to all Divisions 21, 22, and 23 sections.

Provide expansion shells and bolts and concrete screws, formed steel channels, rooftop equipment supports, anchor bolts, supplementary steel framing, and concrete bases for equipment.

Provide sleeves through walls and floor slabs.

Provide pipe markers and color bands, underground pipe markers, equipment nameplates, and valve tags.

Provide access to mechanical equipment, valves, dampers, and controls by means of access doors in inaccessible ceilings.

Paint exposed equipment, piping, sheet metal work, and supports.

230513 – Electrical Provisions

The Work includes factory and field installed motors and motor starters, and associated appurtenances.

Motors shall comply with requirements in NEMA MG 1, squirrel-cage induction polyphase type for 1/2 hp and larger, permanent-split capacitor or capacitor-start single phase for 1/3 hp and smaller.

Motors: Open dripproof for indoor locations, totally enclosed fan cooled for outdoor locations, and dust proof and explosion proof to appropriate applications. Include shaft grounding ring for motors 2 hp and larger.

Motors: Premium efficiency for 1-1/2 hp and larger.

Electronically Commutated Motors (ECMs): Motor with built-in soft start, soft speed change ramps, and permanently lubricated ball bearings. Include device to limit electric harmonic distortion.

Motors Controlled by Variable Frequency Drives: Inverter rated with Class F temperature rise and H insulation and shaft grounding system.

Equipment Short Circuit Current Rating (SCCR): Include nameplate indicating SCCR of mechanical equipment packaged systems, control panels, motor starters, motor controllers, variable frequency drives, and similar equipment.

230520 – Mechanical Demolition

The Work includes selective demolition of existing mechanical work.

Materials to the Owner: Refer to the drawings.

Remove demolished materials from site.

230548 – Vibration Isolation

The Work includes products to isolate building structure and occupied spaces from vibration transmission for mechanical equipment and distribution systems in accordance with requirements of acoustical consultant. Mason Industries, Amber/Booth, Kinetics Noise Control, Vibration Mountings & Controls, Vibro-Acoustics, California Dynamics Corp (Caldyn), TOLCO, or approved.

Vibration isolation mounts include open springs, housed seismic restraint springs, and neoprene mounts.

Bases include supported integral structural steel frames, concrete inertia bases, hung integral structural steel frames, curb mounted isolation bases, and rigid roof curbs.

Vibration isolation hangers include spring and neoprene hangers.

Miscellaneous supports include isolation pads and neoprene washers and bushings.

Acoustical Wrap: Limp mass barrier material in sheet form for enclosing noise sources.

Flexible Connectors for Ducts: Flexible, woven fiberglass type with neoprene coating for indoor applications and insulated woven polyester type with vinyl coating for outdoor applications.

Flexible Connectors for Pipes: Braided type for sizes 2 inch and smaller and elastomeric type for sizes 2-1/2 inch and larger.

230550 – Seismic Control

The Work includes seismic restraints for mechanical equipment and distribution systems. Mason Industries, Amber/Booth, Kinetics Noise Control, Vibration Mountings & Controls, Vibro-Acoustics, California Dynamics Corp (Caldyn), TOLCO, or approved.

Seismic restraints include base mounted restraints and cable assemblies for hung vibration isolated equipment, piping, and ducts per IBC and ASCE 7 requirements.

230593 - Testing, Adjusting, and Balancing

The Work includes testing, adjusting, and balancing (TAB) of mechanical systems.

TAB performed by an independent contractor not affiliated with the Contractor, NEBB or AABC certified, with minimum 5 years' experience on projects of similar scope and complexity.

Mechanical contractor responsible for systems operation, inspection, set-up prior to TAB work, and drive changes as directed by TAB contractor.

TAB work performed in accordance with NEBB or AABC. Adjusts quantities to within percent of design values as follows:

Supply Air Outlets and Fans: 0 to plus 10 percent

Return and Exhaust Air Fans: plus or minus 5 percent

Return and Exhaust Air Inlets: plus or minus 5 percent

Heating and Cooling Flows: plus or minus 5 percent

TAB contractor prepares and submits balancing report.

230700 – Mechanical Insulation

The Work includes insulation for plumbing and HVAC piping, ductwork, and equipment.

Insulation Thickness: Comply with requirements of the Washington State Energy Code Commercial Provisions.

Pipe Insulation:

Fiberglass with K-value not greater than 0.23. Include all-service jacket and self-sealing lap for domestic hot, cold, and hot water circulating water piping, indirect condensate drain piping, heating water, steam, steam condensate return and pumped return piping, chilled water piping, make-up water piping, and horizontal rainleader and overflow rainleader piping. CertainTeed, Knauf Insulation, Manson, Johns Manville, Owens-Corning, or approved.

Elastomeric with K-value not greater than 0.27 for refrigerant suction piping and buried hot and cold plumbing and HVAC piping. 3 to 6 PCF. Aeroflex USA, Aerocel, Nomaco K-Flex, Armacell, or approved.

Calcium silicate with K-value not greater than 0.68 for emergency generator exhaust piping and muffler. 14.5 PCF. Industrial Insulation Group, LLC Thermo-12 Gold®.

Cellular glass with K-value not greater than 0.29 for hot and cold HVAC piping installed in trenches and utilidors. 7.5 PCF. Pittsburg Corning Formglas or approved.

Duct and Equipment Insulation: Fiberglass, duct wrap with vapor barrier jacket for concealed applications and rigid board for exposed applications. Exhaust ducts and factory insulated equipment not insulated except as required by Energy Code. 0.75 PCF for duct wrap and 3 PCF for concealed and 6 PCF for exposed rigid board. CertainTeed, Knauf Insulation, Manson, Johns Manville, Owens-Corning, or approved.

Provide additional insulation for internally soundlined ducts if required by Energy Code.

230800 – Systems Commissioning Support

The Work includes Divisions 21, 22 and 23 responsibilities and participation in commissioning process to demonstrate compliance of mechanical systems in accordance with the Contract Documents.

Contractor to provide commissioning and support to Commissioning Authority (CA) (hired directly by the Owner) for the Work.

Contractor completes pre-functional check lists.

Support includes assisting CA in preparing commissioning plan.

Support includes start-up, testing, and functional testing services for mechanical equipment and systems.

Support includes participation in commissioning during peak and non-peak seasons and training the Owner's staff.

230810 – Systems Training

The Work includes training the Owner's personnel in operation, maintenance, and management of mechanical systems.

Training includes both classroom and field sessions, conducted by factory trained specialists, and video recorded.

After conferring with the Owner, an allowance of hours will be included in the Contract Documents for training.

230820 – Systems Operations and Maintenance Manuals

The Work includes preparation of mechanical systems Operation and Maintenance Manuals.

Manuals shall include product data and parts lists, preventive maintenance schedule and procedures, troubleshooting guide, manufacturer's installation instructions, manufacturer's service instructions, start-up instructions with certificates of start-up and verification, final approved submittals, warranties, final TAB reports, filter, belts, and fuses information, equipment supplier contact information, and Record Drawings.

Manuals shall be assembled in 3-ring binders and submitted also in electronic format.

230900 – Automatic Temperature Controls

The Work includes design, components, hardware, and construction for complete installation of operational Direct Digital Control (DDC) system.

Designed and installed by the local office or authorized representative of controls manufacturer. Alerton installed by ATS. No substitutions.

Shop Drawings: Prepare detailed schematic diagrams, floor plans, sequences of operation, wiring diagrams, DDC panel layouts and schematics, DDC software data, DDC point list, and BACnet protocol implementation conformance statements.

DDC System Components:

Stand-alone and application specific controllers with analog and digital inputs and analog and digital outputs to suit mechanical systems and applications.

Supervisory and global controllers which supervise and monitor mechanical equipment through a network of stand-alone and application specific controllers.

DDC System Software:

Stand-alone and Network and Network Communications: Includes local area network (LAN), automatic dial-up telephone line modem connection, and internet connection.

Sensing and Control Hardware:

Temperature Sensors: Thermister type for room, duct, pipe, and outside air temperature applications.

Carbon Dioxide (CO₂) Sensors: Wall or duct mounted device for demand controlled ventilation. 0 to 2000 ppm sensing range with plus or minus 30 ppm accuracy. Vaisala, SenseAir, Telair, AirTest Technologies, or approved.

Indoor Air Quality (IAQ) Sensors: Used to measure volatile organic compounds (VOC) for demand controlled ventilation. Global Controls, Triatec, Teletrol, Building Automation Products, or approved.

Differential Air Pressure Transmitter: Device with integral pressure transducer and transmitter for monitoring and alarming air filter pressure drop.

Differential Air Pressure Switch: Device for air filter alarm as to final pressure drop before filter changeout. Plus or minus 2 percent accuracy.

Differential Static Pressure Switch: Device for proof of fan operation if current transducer is not used.

Low Temperature Protection Switch (Freezestat): Device installed downstream of hydronic heating coils for freeze protection.

Current Transducers (Current Sensing Relay): Device to monitor motor amperage.

Airflow Measuring Units: Thermal type for duct or fan inlet mounting. Ebtron or approved.

Controlled Hardware:

Motorized Dampers: Airfoil blade, low leakage type.

Motorized Dampers, Indoor Air Quality: Airfoil blade, ultra-low leakage type with pleated media filter in accordance with Section 234100, electric actuator, and control panel. Ruskin, Honeywell, or approved.

Electric Actuators: Direct drive for valve and damper control applications. Belimo Aircontrols, Dodge Engineering & Controls, Bray Controls, or approved.

Auxiliary Components:

Control Panels: NEMA 1 construction.

Nameplates and Tags: Laminated engraved plastic.

Variable Frequency Drives (VFD): Furnished and installed as part of the automatic temperature controls system in accordance with Section 230915. For packaged equipment, VFDs furnished to equipment supplier for factory installation.

230915 – Variable Frequency Drives

The Work includes variable frequency drives (VFD) for Division 22 and 23 sections equipment. VFDs shall be furnished and installed by controls system subcontractor specified in Section 230900.

Variable Frequency Drive (VFD) shall comply with requirements in IEEE 519, UL 508, or ETL and be compatible with motors.

Variable torque type in NEMA enclosure for rated for proposed installation location with overcurrent protection.

Manufacturer's authorized representative shall verify installation and perform start-up.

Manufacturers: Yaskawa, ABB, Allen Bradley, Danfoss, Honeywell, Square D, Franklin Controls Systems, or approved.

231123 – Natural Gas Piping Systems

The Work includes natural gas piping and associated appurtenances.

Piping:

Black steel with threaded fittings for low pressure piping and welded fittings for medium and high pressure piping for exposed installations.

Corrugated stainless steel tubing (CSST) for concealed installations.

Polyethylene for underground installations exterior to the building.

Valves:

Valves 2-1/2 Inch and Smaller: Bronze body, square head cock with threaded ends and handle.

Valves 3 Inch and Larger: Cast iron body square head cock with flanged ends and handle.

Solenoid Valves: Low voltage, brass or aluminum body, 2 position.

Seismic Shutoff Valves: UL and IAMPO listed and labeled.

Pressure Regulator: Cast iron body with adjustable spring for outdoor locations and ventless type for indoor locations.

Natural Gas Submeter:

Turbine Meter: Aluminum body, 20 to 1 turndown with pulse signal output for connection to Direct Digital Control system specified in Section 230900.

Diaphragm Meter: Die-cast aluminum case, 100 to 1 turndown with pulse signal output for connection to Direct Digital Control system specified in Section 230900.

232116 – Piping Specialties

The Work includes pipe hangers and supports, strainers, thermometers, pressure gages, temperature/pressure test ports (Pete's Plugs), alignment guides, and associated appurtenances for piping that apply to multiple systems. Specialty components specific to a single system are specified in that particular section.

Pipe Hangers and Supports: Factory fabricated complying with MSS SP-58. Anvil International, Unistrut, PowerStrut, Superstrut, PHD, Cooper B-Line, TOLCO, Simpson Strong-Tie, or approved.

Y-type Strainers: Y-type with 3/64 inch perforations at 233 per square inch. Armstrong Fluid Technology, Watts, Crane, Hoffman Specialty, Metraflex, Spirax Sarco, Nibco, or approved.

Thermometers: Separable socket, 9 inch scale length with non-toxic colored organic spirit filled glass tube. Weiss Instruments, Ashcroft, Palmer Wahl, Trerice, Weksler, Marsh, Taylor, Miljoco, or approved.

Pressure Gages: 4-1/2 inch size for stem mounting. Weiss Instruments, Lonergan, Weksler, Marsh, Taylor, AMETEK U.S. Gauge, Ashcroft, Trerice, Miljoco, or approved.

Temperature/Pressure Test Ports (Pete's Plugs): Brass with extension for insulated pipes. Peterson Equipment Company, Sisco P/T Plug, or approved.

Thermal/Seismic Flexible Loops: Metraflex Metraloop, Flex-Hose Tri-Flex Loops, Mason Industries 60° Vees Models VFL, VMN, VGN, and VWN, Metraflex Metraloop V-Loop, or approved.

Alignment Guides: Factory fabricated with guide and spiders. ADSCO, Advanced Thermal Systems, Flex-Hose, Hyspan, Metraflex, Michigan Hanger, Senior Flexonics Pathway, or approved.

Thermal Expansion Joints: Packed metal type, base mounted body, and slip tube. Single or double type with or without anchor base. Hyspan Precision Products, Inc., Advanced Thermal Systems, Inc., or approved.

Pipe Anchors: Field fabricated or factory assembled, base mounted with thrust plates and structural inserts. Pipe Shields, Inc., Anvil International, Hyspan Precision Products, Inc, or approved.

Pipe Wrap: 10 mil thick vinyl pipe wrap for buried steel pipe. Lone Star Specialties Trantex Tapes or approved.

Pipe Escutcheons: Nickel or chrome finish for occupied areas and prime paint finish for unoccupied areas.

233100 – Air Distribution

The Work includes sheet metal work and associated appurtenances.

General: Galvanized steel fabricated and installed in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible.

Shop Drawings: Provide detailed shop drawings of ductwork installation, minimum scale 1/4 inch to foot.

Pressure Classification:

Low pressure, 2 inch water gage, supply air ducts not designated as medium pressure, supply air ducts downstream of VAV and fan powered terminal units, return air ducts, exhaust air ducts, outside air ducts. SMACNA Seal Class A.

Round and Flat Oval Ducts: Spiral seam.

Fittings: Full radius elbows or double wall turning vanes.

Exhaust Ducts for Locker Rooms, Showers, Pools, Spas, and Similar Wet Areas: Aluminum

Clothes Dryer Vent Ducts: Aluminum or stainless steel.

Four-Bolt or Corner-Clip Duct Connection System: Used at Contractor's option. Ductmate Industries, Nexus, Ward Industries, or approved.

Factory Soundlined Ducts: Double wall, internally lined, thickness in accordance with requirements of acoustical consultant. McGill Airflow Acousti-k27 or approved.

Flexible Ducts: Factory insulated with vapor barrier, 1 inch thick fiberglass insulation, and steel spring helix reinforcement. Thermaflex MK-E, Wiremold 57K, Flexmaster 8m, or approved.

Duct Soundlining: Fiberglass.

Pressure Testing for Leakage: Supply, return, exhaust, and outside air ducts per procedures in SMACNA HVAC Air Duct Leakage Test Manual.

233300 – Air Distribution Accessories

The Work includes accessories for air distribution systems and associated appurtenances.

Volume Dampers and Quadrants: Provide for each outlet and inlet and in branch ducts serving more than one opening.

Backdraft Dampers: Extruded aluminum with field adjustable blades for installations at exhaust and relief air duct terminations that do not have motor operated dampers. Ruskin, Greenheck, Nailor Industries, or approved.

Fire Dampers: UL listed, blades recessed out of air stream for 100 percent free area. Ruskin, Air Balance, Nailor Industries, or Greenheck.

Electric Duct Heaters: Slip-in type with control box containing airflow switch, automatic reset thermal cutout, mercury contactors, overcurrent protection, fused disconnect switch, control

transformer. Heater coil controlled by silicon controlled rectifiers (SCRs). INDEECO, Valley, Markel, Chromolox, Brasch, Neptronic, Nailor Industries, or approved.

Duct Silencers (Sound Traps): Pre-fabricated baffle type for mounting in air handling units and ducts. IAC Acoustics, Rink, Dynasonics, Semco, VAW Systems, Vibro-Acoustics, or approved.

233400 – Air Distribution Equipment

The Work includes fans, fan drives, and associated appurtenances.

Plenum Fans: Unhoused, electric motor driven centrifugal type with airfoil blades, direct drive. Greenheck, Loren Cook, Huntair, Twin City, or approved.

In-Line Centrifugal Fans: Galvanized steel housing, backward inclined aluminum fan wheel, motor driven. Greenheck, Loren Cook, or approved.

Roof Exhaust Fans: Factory assembled, roof mounted, direct driven fan, aluminum backward inclined centrifugal fan wheel. Loren Cook, Greenheck, or approved.

Upblast Roof Exhaust Fans: Factory assembled, roof mounted, upblast direct driven fan, aluminum housing and aluminum backward inclined centrifugal fan wheel. Loren Cook, Greenheck, or approved.

Fan Drives: Variable pitch for 10 hp and smaller and fixed pitch for 15 hp and larger.

233700 – Air Devices

The Work includes grilles and diffusers, louvers, and associated appurtenances.

Grilles: Titus, Krueger, Anemostat, Metalaire, Kees, Tuttle & Bailey, Nailor Industries, Price Industries, or approved.

Supply Grilles: Double deflection with front blades horizontal.

Diffusers: Titus, Krueger, Anemostat, Metalaire, Kees, Tuttle & Bailey, Nailor Industries, Price Industries, or approved.

Ceiling Diffusers: Square face, modular type with adjustable throw direction.

Ceiling Diffusers: Square face with removable inner cones and adjustable vanes.

Ceiling Diffusers: Round face, round neck with adjustable and removable center core.

Ceiling Diffusers, Self Contained: Thermally powered variable air volume using 2 room temperature sensing elements and 1 changeover thermal element.

Linear Diffusers: Extruded aluminum with adjustable pattern controller.

Louvers: Furnished and installed as part of general construction work.

234100 – Filters

The Work includes air filters for air handling equipment and associated appurtenances.

Replaceable Pre-Filters: Pleated media type in supporting frame, 2 inch thick, Minimum Efficiency Reporting Value (MERV) 8. Camfil, AAF International, Flanders, or approved.

Final Filters: Extended surface cartridge type, 4 inch thick, MERV 13. Camfil, AAF International, Flanders, or approved.

Filters During Construction: Pleated media type that has been electrostatically charged, 1 inch thick, MERV 8. Camfil, Flanders, or approved.

235500 – Fuel Fired Heating Equipment

The Work includes fuel fired furnaces, heating and ventilating units, heat recovery units, packaged kitchen make-up air/exhaust units, unit heaters, and associated appurtenances.

Packaged Heat Recovery/Electric Units: Factory assembled semi-custom unit, 2 inch thick insulation for rooftop installation, internal spring isolated, electric motor driven plenum fan, indirect gas-fired duct heater, filter section with 2 inch pleated media filters in accordance with Section 234100, and air-to-air energy wheel with outdoor air and exhaust air dampers. Packaged, air-to-air air conditioning unit heat pump with natural evaporator and condenser fans, hermetic scroll compressor, evaporator coil, refrigeration system, and controls. Aaon, Valent, Daikin, or approved.

238100 – Packaged HVAC Equipment

The Work includes packaged HVAC equipment with mechanical cooling capabilities and associated appurtenances.

Rooftop Gas/Electric Units: Packaged, air-to-air air conditioning unit heat pump with natural gas heat section, evaporator and condenser fans, hermetic scroll compressor, filter, evaporator coil, refrigeration system, economizer cycle, and controls. Aaon, Valent, Daikin, or approved.

DIVISION 26 - ELECTRICAL

260500 – General Electrical Provisions

Work includes materials, equipment, labor, supervision, tools and items necessary for the construction, installation, connection, testing and operation of electrical work. This section applies to all Division 26, 27 and 28 sections.

Provide electrical work in conformance with the International Building Code, Washington State Nonresidential Energy Code, NFPA, National Electrical Code, and applicable state and local codes, ordinances and standards.

Perform work in accordance with state and local safety regulations.

Prepare product data and shop drawing submittals.

Prepare record drawings.

Prepare Operation and Maintenance Manuals for equipment and materials furnished under Divisions 26, 27 and 28.

Products shall be new unless indicated otherwise in the Contract Documents.

Substitutions will be considered following bid award only when a product becomes unavailable through no fault of the Contractor.

The electrical drawings are diagrammatic. Complete details of building features which affect electrical installation may not be shown.

The Contractor shall visit site during bidding period to note conditions affecting installation of Work.

Include minimum 1 year parts and labor warranty except where longer warranties are required in individual specification sections. Warranty commences with date of Substantial Completion.

Manuals shall be assembled in 3-ring binders and submitted also in electronic format and include product data and parts lists, preventive maintenance schedule and procedures, troubleshooting guide, manufacturer's installation instructions, manufacturer's service instructions, start-up instructions with certificates of start-up and verification, final approved submittals, warranties, equipment supplier contact information, and Record Drawings.

260510 – Basic Electrical Materials and Methods

Work includes basic electrical requirements. This section applies to all Division 26, 27 and 28 sections.

Prepare and post operating instructions including equipment control and power diagrams.

Provide block-outs and sleeves through walls and floor slabs.

Perform earthwork required for installation of electrical work below grade.

Provide 4 inch high reinforced concrete bases for floor mounted and floor standing electrical equipment.

Train the Owner's personnel in the operation, maintenance, and management of the electrical systems. Training shall include field sessions, conducted by factory representatives.

260511 – Electrical Connections For Equipment

Work includes final electrical connection to equipment having electrical requirements.

Connection to Equipment Specified in Divisions 21, 22 and 23 as Follows unless Specified Otherwise in Divisions 21, 22 and 23:

For motorized only equipment with built-in controllers (packaged equipment), Connect power and provide an external disconnect at equipment. Division 23 will provide control wiring.

For motorized only equipment with external controller (non-packaged equipment), provide external motor controller, disconnect switch, and make power wiring complete to equipment. Division 23 will provide control wiring.

For electric duct heaters with built-in controllers (packaged type equipment), connect power complete and provide external disconnect switch at equipment. Division 23 will provide control wiring.

For electric duct heaters with remote controllers (non-packaged type equipment), provide external controller, disconnect switch, and make power wiring to equipment. Division 23 will provide control wiring.

For combination motorized and electric heating packaged units specified with built in controllers and specified with "single point electrical connection" under Division 23, connect power and provide external disconnect switch. Division 23 will provide control wiring.

For equipment requiring a full voltage non-reversing starter, include as a combination disconnect unit.

Coordinate installation of electrical connections for equipment with installed equipment.

Install non-packaged starters and wiring devices near motors or as indicated on the Drawings.

Install power metering equipment at panelboards and switchboards furnished by control system subcontractor.

260512 – Electrical Demolition

Work includes selective demolition of existing electrical work.

Provide protective measures to minimize transfer of noise, dust, dirt, and refuse to adjacent areas of building.

Protect existing equipment, furnishing, and systems with protective coverings.

Promptly repair damage to existing surfaces, equipment, finishes, or adjacent facilities at no cost to the Owner and to the satisfaction of the A/E and the Owner

Materials to Owner: Demolished electrical gear

Upon completion of demolition work, remove tools, equipment and demolished materials from site

260519 – Wire and Cables

Work includes wire, cable, splices, and terminations for systems 600 Volts and less and associated appurtenances.

Copper Conductors: Type THHN/THWN, 600 Volt, insulated for 115 to 600 Volt circuits. Conductors larger than No. 10 AWG shall be stranded.

Aluminum Conductors: Used at Contractor's option (except for ground cable) with the following requirements:

- Increased size for same current capacity (increased raceway size may be necessary).

- No aluminum conductors smaller than No. 2 AWG.

- Insulation requirements same as for copper wire and cable.

- Terminate or splice using compressing type oxide inhibiting compound filled aluminum lugs only.

- Compression Fittings: Sized for conductor used and set with tool which ensures preset deformation before release.

Remote Control and Signal Circuits as Follows:

- Class 1: Stranded copper type THHN or THWN, 600 Volt, insulated for 115 to 600 Volt circuits.

- Class 2 and 3: Twisted copper, 300 Volt, non-metallic jacket.

Minimum No. 12 AWG for power and lighting circuits and No. 14 AWG for control wiring.

Test cables 600 Volts and less in accordance with Section 260800. Megger circuits 100 Amp and larger.

260529 – Supporting Devices

Work includes conduit and equipment supports, fastening hardware, and associated appurtenances.

Built-up framing for electrical raceway and equipment supporting systems, including but not limited to channel, rod, clamps, and hardware

Channel: 12 gage galvanized formed metal with or without pre-drilled holes, epoxy coated. Cooper B-Line Dura Green, Unistrut, Powerstrut, or approved.

Beam Clamps, in Pairs, at each Supporting (Structural) Beam: B-line B441-22 and B441-22A; Superstrut U-501 and U-502; Unistrut P2785, P2786, and P1379S, or approved.

Beam Clamps for Use with Rods: B-Line B751-J4, B751-J6, B751-J9, and B751-J12; Superstrut U-569; Unistrut P2824-6, P2824-9, and P2824-12, or approved.

Fittings for Attaching Channel-to-Channel for Built-Up Framing: Unistrut P6028, P6033, P6069, P6290, P6291, P6326, P6331, P6332, P6346, P6358A, P6359, P6381, P6382, P6726A, P6917, P6962, or approved.

Connectors for Bracing: Unistrut P6186, P7097, P7098, P7100, P7101, P7108, P7109, P7110, P6546, or approved.

Attach connectors to vertical framing members with 2 bolts.

260533 – Raceway Systems

Work includes conduit, electrical metallic tubing, wireway, surface metal raceway, and associated appurtenances.

Rigid Metal Conduit (RMC) and Fittings: Hot-dip galvanized steel conduit with threaded galvanized fittings.

Intermediate Metal Conduit (IMC) and Fittings: Hot-dip galvanized steel conduit and threaded galvanized fittings.

Electrical Metallic Tubing (EMT) and Fittings: Hot-dip galvanized steel conduit and galvanized steel fittings, compression ring type through 1-1/4 inch and set screw type for 1-1/2 inch and larger. Drive-on type and cast fittings not acceptable.

Flexible Metal Conduit and Fittings: Galvanized steel conduit and fittings. Aluminum and flexible metallic tubing not acceptable.

Liquid-Tight Flexible Metal Conduit and Fittings: Galvanize steel conduit with PVC weatherproof cover and fittings.

Conduit Bodies: Cast malleable iron, zinc or cadmium plated with threaded connections and gasketed covers.

Wireway and Auxiliary Gutter: Lay-in type with hinged cover.

Expansion Fittings: Malleable iron, hot-dip galvanized. OZ/Gedney Type AX Series or approved.

Wall Sealing Fittings: At each wall sealing fitting, include conduit seal fitting, OZ/Gedney FSK Series, Crouse Hinds EYS Series, or approved.

Provide fire rated sealing compound, Dow Corning 3-6548 Silicone RTV Foam or approved.

Conduit sized for type and quantity of conductors, minimum 3/4 inch.

Horizontal conduit installation is not allowed in floor slab.

Rigid Metal Conduit:

Acceptable in all locations except as modified in this section.

Where in contact with earth or concrete utilize PVC Coated Rigid Metal Conduit.

Required for exposed raceways in areas subject to physical damage

PVC Coated Rigid Metal Conduit:

Required in corrosive environments

Intermediate Metal Conduit:

May be used in lieu of rigid metal conduit unless otherwise prohibited by code

Electrical Metallic Tubing:

Acceptable for dry interior locations where not exposed to moisture or physical damage.

Flexible Steel Conduit:

For connections to recessed light fixtures and devices installed in suspended ceilings.

For connections to motors, transformers and other equipment subject to vibration.

Liquid-Tight Flexible Metal Conduit.

For pump motors and equipment subject to vibration in damp and wet locations, in areas subject to being washed down, and for machinery where cutting oil is used.

260534 – Outlet Boxes

Work includes outlet, junction, and pull boxes and associated appurtenances required to enclose devices, permit pulling conductors, and for wire splices and branches.

Outlet Boxes for Interior Wiring: Pressed steel, zinc coated, minimum 4 inch size. Include hinged door for boxes larger than 12 inches in any dimension.

Above Grade: Outlet and junction boxes cast or malleable iron or cast of corrosion resistant alloy compatible with raceway to which they are connected. Pull boxes fabricated of hot dipped galvanized heavy gage steel. Boxes with gasketed covers.

Seal conduit boxes, telephone boxes, and similar items air tight with acoustical caulk where located in acoustical rated walls that are not fire rated.

260548 – Vibration Isolation and Seismic Control

Work includes isolation pads, spring isolators, restrained spring isolators, restraint cables, hanger rod stiffeners, anchorage bushings and washers, and associated appurtenances.

Vibration Isolators: Amber/Booth, California Dynamics Corporation, Kinetics Noise Control, Mason Industries, Vibro-Acoustics, Vibration Mountings & Controls, or approved.

Isolation Pads: Single or multiple layers with galvanized steel baseplates.

Spring Isolators: Freestanding, open-spring type with baseplate and top plate with adjustment bolt.

Restrained Spring Isolators: Freestanding, open-spring type with seismic or limit-stop restraint, baseplate, and adjustable limit-stop

Seismic Restraint Devices: Amber/Booth, California Dynamics Corporation, Cooper B-Line, Hilti, Mason Industries, TOLCO, Unistrut, or approved.

Restraint Cables: Steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service

Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod.

Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings.

Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves.

Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene with a flat washer face.

Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type.

Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive.

260553 – Electrical Identification

Work includes nameplates, wire and cable markers, wire color coding, conduit color coding, buried duct marking tape, arc flash safety signs, and associated appurtenances.

Provide engraved three-layer laminated plastic nameplates for panelboards, switchboards, enclosed circuit breakers, disconnect switches, motor starters, transformers, and automatic transfer switches.

Provide permanent felt marker notations for circuits for junction and pull boxes.

Outlet boxes, junction boxes and pull boxes for emergency system devices and circuits shall be orange in color.

Outlet boxes, junction boxes and pull boxes for fire alarm system devices and conductors shall be red in color.

Provide color coded split sleeve or tubing type markers for wires and cables.

Provide vinyl colored electrical tape for phase identification.

Provide color coded marking tape for buried electrical (power), telephone, and cable television ducts.

260573 – Fault Calculations and Protective Coordination Study

Work includes preparation of fault (short-circuit) calculations for distribution system and protective device coordination study of distribution system to ensure that protective devices in system are coordinated. Study shall be based on actual devices installed.

Prepare fault calculations and protective device study using a network analyzer, digital computer, or by written calculations.

260800 – Electrical Testing

Work includes testing requirements for individual components, equipment, systems, and integration to ensure intended facility operation. Test modes of operation and interlocks and alarm functions.

Provide complete, comprehensive testing and commissioning in addition to minimum requirements specified in individual sections and in this section.

Include comprehensive Owner operation and maintenance training of individual components, equipment, and systems. Training includes normal operation and alternate modes of operations.

260923 – Lighting Controls

Work includes an integrated, energy saving lighting control system including lighting control panels, occupancy sensors, emergency lighting transfer devices, daylighting controls, and associated appurtenances.

Provide relay panels, NEMA 1 rated enclosure, surface or flush mounted, hinged, and lockable to house relays. Panels with interior barriers to separate high voltage (Class 1) and low voltage (Class 2) wiring. Include networking connection to allow group control of relays, low voltage switches, and override switches for manual control. ILC, Watt Stopper, Leviton, Hubbell, or approved.

Occupancy/Vacancy Switches: Dual technology type which use passive infrared and ultrasonic technologies for occupancy detection to control electronic ballasts, PL lamp systems, and rated motor loads. Include user adjustable settings for time delay and sensitivity, manual bypass override, and LED lights. Include internal additional isolated relay with normally open, normally closed, and common outputs for use with HVAC control, data logging, and other control options. Sensor Switch, Watt Stopper, Leviton, Hubbell, or approved.

Time Clocks: Electronic, solid-state programmable type with alphanumeric display, astronomic feature, automatic daylight savings time reset, battery carry over, two channel unless indicated otherwise, 24 hour and 365 day calendar, skip-a-day. Intermatic ET700C Series Time Switch or equivalent.

Interior Daylighting Photosensor Dimming: Self-contained, ceiling or fixture mounted control device with photocell.

262220 – Transformers

Work includes dry-type and shielded isolation transformers and associated appurtenances. Eaton/Cutler Hammer, Tierney, or approved.

Transformers:

Designed for continuous operation at rated kVA for 24 hours a day and 365 days a year operation with 220 C insulation based on 150 C rise and 40 C maximum ambient.

NEMA TP 1, Class 1 efficiency levels.

NEMA 1 rated for dry interior locations and NEMA 3R where exposed to moisture.

Shielded isolation transformers to include full width electrostatic shields.

262416 – Panelboards

Work includes panelboards including lighting and appliances, distribution and load centers, and associated appurtenances. Square D, General Electric, Siemens, Eaton/Cutler Hammer, or approved.

Enclosure: Flush or surface mounted with lockable door.

Lighting and Appliance Panelboards: Dead-front safety type with bolt-on thermal magnetic type branch breakers, copper bus bars, full-sized neutral bus, and ground bus.

Power Distribution Panelboards: Dead-front safety type with copper bus bars, full-sized neutral bus, ground bus, and fusible or circuit breaker branch and main devices.

262726 – Wiring Devices

Work includes wall switches, receptacles, device plates, box covers, and associated appurtenances. Leviton, Bryant Electric, General Electric, Hubbell, Pass and Seymour, or approved.

Wall Switches:

Match existing.

Wall Switches for Lighting Circuits: General use snap switch with toggle handle rated 20 Amps and 120/277 Volts AC. Specification grade.

Receptacles: Duplex, single, isolated ground duplex, weatherproof for exterior locations, GFCI, or tamper resistant types. Match existing. Specification grade.

Device Plates:

Finish and Material: Type 302 non-magnetic stainless steel.

Wall Plates:

With 1/4 inch black letters "GFCI PROTECTED" for receptacles protected by GFCI circuit breaker or feed-through GFCI receptacle.

262813 – Overcurrent Protective Devices

Work includes overcurrent protective devices for operation at 600 Volts and below including circuit breakers, fusible switches, fuses as individual components in separate enclosures and for installation as integral components of switchboards and panelboards and associated

appurtenances. Main and branch device manufacturer same as panelboard and switchboard manufacturer.

Molded Case Circuit Breakers: Factory-assembled units for lighting and appliance panelboards. Include overcenter, trip free, toggle type operating mechanism with quick-make/quick-break action and positive handle indication. Eaton/Cutler Hammer, General Electric, Siemens, Square D, or approved.

Insulated Case Circuit Breakers: Individually mounted with electronic trip unit. Eaton/Cutler Hammer, General Electric, Siemens, Square D, or approved

Fusible Circuit Breakers: Bussmann Mfg. Co.

Fuses:

Branch Circuits: UL Class RK for motor circuits, transformer circuits, and other inductive loads.

Bussman Mfg. Co. or Ferraz Shawmut. No substitutions.

262816 – Disconnect Switches and Enclosed Circuit Breakers

Work includes disconnect switches and associated appurtenances. Square D, General Electric, Siemens, Eaton/Cutler Hammer, or approved.

Disconnect Switches: Heavy duty, horsepower rated with padlockable operating handle, visible blades, reinforced fuse clips, quick-make/quick-break mechanisms, and defeatable door interlock. NEMA 1 rated for dry interior locations and NEMA 3R where exposed to moisture.

Enclosed Circuit Breakers: Thermal magnetic circuit breaker per Section 262813.

264313 – Surge Protective Devices

Work includes Surge Protective Devices (SPD) and associated appurtenances used for the protection of AC electrical circuits from the effects of lightning induced currents, substation switching transients and internally generated transients. Innovative Technology or approved.

Distribution Switchboards & Panelboards: PTX080 Series.

265100 – Lighting

Work includes interior and exterior lighting fixtures, ballasts, lamps and associated appurtenances. Types of lighting fixtures include LED with 0-10v dimming.

DIVISION 28 – LIFE SAFETY AND SECURITY

283111 – Fire Alarm and Detection Systems

Work includes the design and to furnish, install, and connect an analog addressable, intelligent fire alarm and detection system required to form a complete coordinated system ready for operation. It shall include, but not be limited to, initiating devices, alarm notification appliances, control panels, annunciators, auxiliary control devices, power supplies, batteries, wiring and ancillary devices. Edwards/EST. No substitutions.

Fire Alarm Control Panel: Modular construction with solid state microprocessor based electronics with a minimum of 25 percent spare point capacity.

Manual Stations: Constructed of red Lexan with raised white lettering.

Smoke Detectors: Photoelectric type with a plug-in base and visual indication of detector actuation.

Duct Smoke Detectors: Capable of operating in air velocity range of 300 to 2000 feet per minute.

Beam Smoke Detectors: Infrared beam smoke detector including transmitter, receiver and remote control unit. Powered from fire alarm system.

Heat Detectors: Addressable, analog thermal detectors. Rate of rise feature accomplished with electronic, dual thermistors.

Visual Signals: Furnish and install xenon strobes, synchronized in accordance with NFPA 72 chapter 4 and rated to UL 1971 standards.

Audible Signals: Provide speakers for audible signal appliances designed to produce a minimum sound output of 85dbA at 10', or 15dbA above ambient; whichever is greater.

Magnetic Door Holders: Provide by General and wired by Division 26. Holders shall be powered from the fire alarm system.

Remote LCD Annunciators. Remote Annunciator shall be LCD type with key activated controls to allow silencing, resetting and activating of alarms.

Fiber Switch: The system shall include fiber switch to connect to the campus fire alarm network.